

**PATENT COOPERATION TREATY  
PCT**

**INTERNATIONAL SEARCH REPORT**

(PCT Article 18 and Rules 43 and 44)

|  |  |   |
|--|--|---|
| Applicant's or agent's file reference<br><b>1 2557510</b>            | <b>FOR FURTHER<br/>ACTION</b><br><small>see Form PCT/ISA/220<br/>as well as, where applicable, item 5 below.</small> |   |
| International application No.<br><b>PCT/AU2005/000037</b>            | International filing date (day/month/year)<br><b>14 January 2005</b>   | (Earliest) Priority Date (day/month/year)<br><b>16 January 2004</b> |
| Applicant<br><b>ADVANCED GRINDING TECHNOLOGIES PTY LIMITED et al</b> |  |   |

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of **11** sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

**2. ☐ Certain claims were found unsearchable (See Box No. II).**

**3. ☒ Unity of invention is lacking (See Box No. III).**

**4. With regard to the title,**

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

**5. With regard to the abstract,**

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

**6. With regard to the drawings,**

- a. the figure of the drawings to be published with the abstract is Figure No. **I**

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

- b. ☐ none of the figures is to be published with the abstract.

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## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

## Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:  
See extra sheet.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

**Box No. IV Text of the Abstract (Continuation of item 5 of the first sheet)**

The invention relates to processing apparatus and methods in particular, but not exclusively, to an apparatus that may be used to process a wide variety of feed materials by one or more of milling or grinding, mixing, blending, separation, drying and sterilisation. In a preferred embodiment there is provided a feed material processing apparatus (1) comprising:

- a chamber (2);
- at least one inlet (4) in flow communication to an upper region of the chamber (2);
- a rotor (3) located within the chamber (2) that is rotatable about a substantially vertical axis by a rotation drive (11), wherein the rotor (3) promotes a circulatory flow of feed material and/or gas within the chamber (2);
- at least one outlet (5) in flow communication from a lower region of the chamber (2).

Preferably the apparatus (1) comprises at least one feature located laterally on the rotor (3) to promote the circulatory flow.

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## A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. <sup>7</sup>: B01F 7/16, B02C 13/14, 19/06, B04B 5/12, C02F 1/38, F26B 11/14, B09B 3/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

SEE ELECTRONIC DATABASE BELOW

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

SEE ATTACHED SHEET

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|-----------|---|-----------------------|
| X         | Derwent Abstract Accession No. 98-540702/46, Class P41, RU 2108160 C1 (MAKO TSEMENT STOCK CO) 10 April 1998.<br>See whole abstract. | 1-65                  |
| X         | DE 3002429 A1 (YSTRAL GMBH) 30 July 1981.<br>See especially the Figure.   | 1-65                  |
| P,X       | WO 2004/067468 A1 (NELMAPIUS) 12 August 2004.<br>See especially the Examples.   | 1-65                  |
| X         | AU 19540/00 A1 (WHIRLPOOL CORPORATION) 14 September 2000.<br>See especially Figure 1.   | 1-65                  |



Further documents are listed in the continuation of Box C



See patent family annex

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"

document member of the same patent family

Date of the actual completion of the international search

16 February 2005

Date of mailing of the international search report

23 FEB 2005

Name and mailing address of the ISA/AU

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| C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT   |   |                       |
|--|---|-----------------------|
| Category*  | Citation of document, with indication, where appropriate, of the relevant passages                                      | Relevant to claim No. |
| P,X  | DE 10308500 A1 (DER GRÜNE PUNKT) 23 September 2004.<br>See especially Figure 6.   | 1-65                  |
| X  | Patent Abstracts of Japan, JP 2003-093909 (MITSUBISHI ELECTRIC ENGINEERING CO LTD) 2 April 2003.<br>See whole abstract. | 1-65                  |
| X  | Patent Abstracts of Japan, JP 2002-059144 (INOENBAIRO TECHNO KK) 26 February 2002.<br>See whole abstract.               | 1-65                  |
| P,X  | WO 2004/091797 A1 (OUTOKUMPU OYJ) 28 October 2004.<br>See especially Figure 3.  | 1-65                  |
| X  | Patent Abstracts of Japan, JP 2002-282723 (JDC CORP) 2 October 2002.<br>See whole abstract.                             | 1-65                  |
| X  | Patent Abstracts of Japan, JP 2002-035562 (SETO) 5 February 2002.<br>See whole abstract.                                | 1-65                  |
| X  | EP 1273341 A1 (BÜHLER AG) 8 January 2003.<br>See especially Figure 1..  | 1-65                  |
| X  | EP 1208905 A2 (E.I. DU PONT DE NEMOURS) 29 May 2002.<br>See especially Figure 1.  | 1-65                  |
| X  | US 5538342 (AOSHIMA) 23 July 1996.<br>See especially Figure 1..   | 1-65                  |
| <p><b>NOTE:</b> There are many patent documents which fall within the scope of the current claims. The documents cited here are merely a selection of relevant patent literature and do not represent an exhaustive list of potential citations. Due to economic reasons this search was restricted.</p> |   |                       |

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## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|-----------|---|-----------------------|
| X         | AU 15002/97 A1 (LG ELECTRONICS) 4 September 1997.<br>See especially the Figures.  | 1-65                  |
| X         | DE 3916258 A1 (SCHWANER) 22 November 1990.<br>See especially Figure 1.  | 1-65                  |
| X         | Patent Abstracts of Japan, JP 09-066243 (HITACHI LTD) 11 March 1997.<br>See whole abstract.   | 1-65                  |
| X         | Derwent Abstract Accession No. 97-200542/18, Class P28, RU 2066111 C1<br>(KURGANKI IMMASH CHEM EQUIP) 10 September 1996.<br>See whole abstract. | 1-65                  |
| X         | US 4650343 (DOOM) 17 March 1987.<br>See especially the Figures.   | 1-65                  |
| X         | US 4799595 (BINDER) 24 January 1989.<br>See especially Figure 1.  | 1-65                  |
| P,X       | US 2004/0218464 A1 (ARRIBAU) 4 November 2004.<br>See especially Figure 1.   | 1-65                  |
| X         | US 2003/0197080 A1 (KARKOS) 23 October 2003.<br>See especially Figure 1.  | 1-65                  |
| X         | US 2002/0064086 A1 (MORI) 30 May 2002.<br>See especially Figure 1.  | 1-65                  |
| X         | Derwent Abstract Accession No. 2003-595298/56, Class J02, RU 2207901 C2<br>(KEMER FOOD IND TECH INST) 10 July 2003.<br>See whole abstract.      | 1-65                  |
| P,X       | WO 2004/041442 A1 (3NINE AB) 21 May 2004.<br>See especially Figure 1.   | 1-65                  |
| X         | DE 20215158 U1 (NK LOGISTIK NANNI KOLLEY) 23 October 2003.<br>See especially the Figures.   | 1-65                  |

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### Supplemental Box

(To be used when the space in any of Boxes I to VIII is not sufficient)

#### Continuation of Box No: III

The international application does not comply with the requirements of unity of invention because it does not relate to one invention or a group of inventions linked so as to form a single general inventive concept. In coming to this conclusion the International Searching Authority has found that there are different inventions as follows:

1. Claims 1-45 and 47-49. These claims disclose a feed material processing apparatus comprising a chamber, an inlet at the upper region of the chamber, a rotor rotatable about a substantially vertical axis, prompting a circulatory flow of feed material and/or gas, and an outlet in the lower region of the chamber. It is considered that a feed material processing apparatus with these features constitutes a first "special technical feature".

2. Claim 46 and 63-65. This claim discloses a milling apparatus comprising a chamber, an inlet at the upper region of the chamber, a rotor rotatable about a substantially vertical axis, prompting a circulatory flow of feed material and/or gas, and an outlet in the lower region of the chamber. It is considered that a milling apparatus constitutes a second "special technical feature".

3. Claims 50-56. These claims disclose a method for producing a powdered, granulated and/or dried food comprising introducing a feed material to a device comprising a chamber, an inlet at the upper region of the chamber, a rotor rotatable about a substantially vertical axis, prompting a circulatory flow of feed material and/or gas, and an outlet in the lower region of the chamber. It is considered that producing a powdered, granulated and/or dried food constitutes a third "special technical feature".

4. Claims 57-59. These claims disclose a method for processing a waste material comprising introducing waste material to a device comprising a chamber, an inlet at the upper region of the chamber, a rotor rotatable about a substantially vertical axis, prompting a circulatory flow of feed material and/or gas, and an outlet in the lower region of the chamber. It is considered that processing a waste material constitutes a fourth "special technical feature".

5. Claims 60-62. These claims disclose a method of water purification comprising introducing water to a device comprising a chamber, an inlet at the upper region of the chamber, a rotor rotatable about a substantially vertical axis, prompting a circulatory flow of feed material and/or gas, and an outlet in the lower region of the chamber. It is considered that a water purification method constitutes a fifth "special technical feature".

These groups are not so linked as to form a single inventive concept, that is, they do not have any common inventive features, which define a contribution over the prior art. The common concept linking these groups of claims is the features of a chamber, an inlet at the upper region of the chamber, a rotor rotatable about a substantially vertical axis, prompting a circulatory flow of feed material and/or gas, and an outlet in the lower region of the chamber. However, this concept is not novel in the light of the following references:

1. Perry, R.H. and Green, D.W. Perry's Chemical Engineers' Handbook, 7<sup>th</sup> Edition, McGraw-Hill, 1997. See Figure 7-4 (f), Page 7-16.
2. Perry, R.H. and Green, D.W. Perry's Chemical Engineers' Handbook, 7<sup>th</sup> Edition, McGraw-Hill, 1997. See Figure 18-72, Page 18-51.
3. Perry, R.H. and Green, D.W. Perry's Chemical Engineers' Handbook, 7<sup>th</sup> Edition, McGraw-Hill, 1997. See Figure 18-109, Page 18-90.

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### Supplemental Box

(To be used when the space in any of Boxes I to VIII is not sufficient)

#### Continuation of Box No: III

4. McCabe, W.L. et al. Unit Operations of Chemical Engineering, 5<sup>th</sup> Edition, McGraw-Hill, 1993. See Figure 9.1, Page 236.
5. McCabe, W.L. et al. Unit Operations of Chemical Engineering, 5<sup>th</sup> Edition, McGraw-Hill, 1993. See Figure 30.11, Page 1012.
6. Degremont, S.A. Water Treatment Handbook, Stephen Austin and Sons, 1973. See Figure 77, Page 131.
7. Coulson, J.M. and Richardson, J.F. Chemical Engineering Volume Two, 2<sup>nd</sup> Edition, Pergamon, 1976. See Figure 16.18, Page 658.

Consequently the common features do not constitute a "special technical feature" within the meaning of PCT Rule 13.2, second sentence, since they make no contribution over the prior art. Since there exists no other common feature which can be considered as a special technical feature within the meaning of PCT Rule 13.2, second sentence, no technical relationship within the meaning of PCT Rule 13 between the different inventions can be seen. Therefore, a posteriori, the claims do not satisfy the requirement of unity of invention.



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## Supplemental Box

(To be used when the space in any of Boxes I to VIII is not sufficient)

### Continuation of Box No: B (Electronic Databases Consulted)

DWPI; IPC B01F 5/02, 7/16, 7/18, 7/20, 7/22, 7/24, 7/26, 7/28, 7/30, 7/32 and "vertical+", B04B 5/12, B03D 1/14, 1/16, 1/18, 1/20, 1/22, C02F 1/38, 1/58, A47J 19/-, 44/-, 43/00, 43/04, 43/04+, 43/06, 43/07, 43/08, 43/09, 42/00, 42/02, 42/04, 42/0+, 42/1+, 42/2+, 42/3+, 42/40, B02C 13/14, 13/16, 13/18, 13/20, 13/22, 13/24, 18/06, 18/08, 18/10, 18/12, 18/40, 18/42, 19/06, A47L 5/-, F26B 11/14, F04D 1/-, 3/-, B09D 3/00 and "vertical" and (impeller+" or "impeller+" or "rotor+").

# INTERNATIONAL SEARCH REPORT

Information on patent family members

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This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

| Patent Document Cited in Search Report |            |      | Patent Family Member |    |            |    |            |
|--|------------|------|----------------------|----|------------|----|------------|
| RU                                     | 2108160    | NONE |                      |    |            |    |            |
| DE                                     | 3002429    | NONE |                      |    |            |    |            |
| WO                                     | 2004067468 | ZA   | 200401291            |    |            |    |            |
| AU                                     | 1954000    | AU   | 19540/00             | BR | 0001737    | CN | 1266117    |
|  |            | EP   | 1035245              | HU | 0001004    | NZ | 502991     |
|  |            | US   | 6115863              |    |            |    |            |
| AU                                     | 1500297    | AU   | 15002/97             | AU | 64128/00   | AU | 64129/00   |
|  |            | CN   | 1170058              | CN | 1431355    | CN | 1431356    |
|  |            | JP   | 9253387              | JP | 2000334196 | JP | 2000350893 |
|  |            | JP   | 2002028396           |    |            |    |            |
| DE                                     | 3916258    | DD   | 299615               |    |            |    |            |
| US                                     | 2004218464 | US   | 2004218465           | WO | 2004098761 |    |            |
| US                                     | 2003197080 | AU   | 28480/00             | BR | 0007482    | CA | 2360525    |
|  |            | EP   | 1139837              | HK | 1043293    | ID | 29872      |
|  |            | MX   | PA01007055           | NZ | 513327     | US | 6095677    |
|  |            | US   | 6210033              | US | 6336603    | US | 6793167    |
|  |            | US   | 2001002892           | US | 2002079393 | WO | 0041607    |
|  |            | WO   | 2004043213           | ZA | 200106332  |    |            |
| US                                     | 2002064086 | EP   | 1210973              | JP | 2002166154 | US | 6435707    |
| DE                                     | 20215158   | NONE |                      |    |            |    |            |
| DE                                     | 10308500   | NONE |                      |    |            |    |            |
| WO                                     | 2004091797 | FI   | 20030589             |    |            |    |            |
| WO                                     | 2004041442 | SE   | 0203234              |    |            |    |            |
| EP                                     | 1273341    | CN   | 1404910              | US | 6789935    | US | 2003072215 |
| EP                                     | 1208905    | AU   | 89267/01             | CN | 1358562    | JP | 2002204937 |
|  |            | US   | 6508583              |    |            |    |            |
| US                                     | 5538342    | JP   | 8192038              |    |            |    |            |
| JP                                     | 2002035562 | NONE |                      |    |            |    |            |
| JP                                     | 2002059144 | NONE |                      |    |            |    |            |
| JP                                     | 2002282723 | NONE |                      |    |            |    |            |
| JP                                     | 2003093909 | NONE |                      |    |            |    |            |

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Information on patent family members

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|   |         |      |          |    |          |
|---|---------|------|----------|----|----------|
| RU  | 2207901 | NONE |          |    |          |
| RU  | 2066111 | NONE |          |    |          |
| JP  | 9066243 | NONE |          |    |          |
| US  | 4650343 | US   | 4754437  |    |          |
| US  | 4799595 | BR   | 8606325  | CA | 1273318  |
|   |         | DK   | 617486   | EP | 0226987  |
|   |         | JP   | 62216681 | CN | 86108282 |
|   |         |      |          | IN | 169766   |
| Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001. |         |      |          |    |          |
| END OF ANNEX  |         |      |          |    |          |